Openforum Academy

Prospective analysis of net neutrality policy scenarios

Google Policy Fellowship Research

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This research involved a series of interviews with experts and a bibliographical review. Five different policy scenarios are defined according to current trends and relevance; driving forces are identified; the impact and likely evolution of the market in each scenario is outlined as a result of the driving forces acting in each scenario.

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INTRODUCTION

In the context of the net neutrality debate, there have been strong claims that there is a need to safeguard the open character of the internet, preserving free, non-discriminatory user access to the content, applications or services available online. This debate blends with the discussion on open internet and the need to keep the internet platform open to innovation, as a guarantee for the economic, social and technological development it offers (1).

Through various discussions, including public consultations on both sides of the Atlantic, some consensus has been reached on certain aspects of the debate: the need to preserve the open character of the internet, the central role of the user, the defence of competition, promotion of investment and innovation, the need for transparency and the need for "reasonable traffic management" techniques. However, these agreed upon principles leave open many questions (for example, what is "reasonable traffic management") and there is strong division concerning the application of policy and regulation.

Much of the debate focuses around prospective scenarios: advocates on both sides argue on the basis of what a certain regulation, or the lack thereof, will do to the future internet. In Europe, the Electronic Communications Framework makes a reference to the net neutrality principle: "End-users should have the ability to access and distribute information or run applications and services of their choice" (2). The Body of European Regulators for Electronic Communications (BEREC) published evidence on traffic management by ISPs (3) that raise concerns and the European Commission has been urged to address the net neutrality issue (4) (5). Different Member States have started to take different approaches in this matter that could lead to a fragmentation of the Digital Single Market (2). Recent episodes have revitalized the debate and are indicative of impending policy making in the European Union.

There is widespread recognition that the future internet may have a very different architecture, players and (therefore) governance structures. It is clear to all that these changes reflect issues with the current internet and that today's institutional changes will determine tomorrow's balance of power (6).

AUTHORS

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After gaining two degrees in mathematics from Cambridge University, Moody entered business journalism before specialising in the field of computers in 1983. He started writing and lecturing about business use of the internet in early 1994 and about open source in 1995. In 1997 he wrote the first mainstream feature about GNU/Linux and free software, which appeared in Wired magazine (http://www.wired.com/wired/archive/5.08/linux_pr.html).

His book, "Rebel Code: Linux and the Open Source Revolution" - the only detailed history of free software written so far - was published in 2001. "Digital Code of Life: How Bioinformatics is Revolutionising Science, Medicine and Business" appeared in 2004, and explores the rise and importance of the digital genomics.

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Organisation

The Google Policy Fellowship programme offers undergraduate, graduate, and law students interested in internet and technology policy the opportunity to spend the summer contributing to the public dialogue on these issues, and exploring future academic and professional interests. It offers the opportunity to work at public interest organizations at the forefront of debates on broadband and access policy, content regulation, copyright and trademark reform, consumer privacy, open government, and more. Fellows will be assigned a lead mentor at their host organizations, but will have the opportunity to work with several senior staff members over the course of the summer.

OpenForum Academy is a think tank with a broad aim to examine the paradigm shift towards openness in computing that is currently underway, and to explore how this trend is changing the role of computing in society. It is an independent programme established by OpenForum Europe. It has created a link with academia in order to provide new input and insight into the key issues which impact the openness of the IT market.

METHODOLOGY

The objectives of this paper are to examine the regulatory alternatives dealing with net neutrality in the European context and to provide some insight as to which are the consequences of launching (or not) net neutrality policies in Europe.

Our approach to these objectives was to identify which are the regulatory alternatives and assess how they reshape the ecosystem (market dynamics, users' rights and infrastructure development).To address these objectives, we performed interviews to a varied group of experts, whose knowledge, experience and perspective we could use to gather a broad spectrum of opinions, insight into how the scenarios might develop and guide to bibliographical research.

The complexity of strategic problems and the need to resolve them collectively means using methods that are as rigorous and participatory as possible to recognize the problem and find acceptable solutions. Of course, we must keep in mind the limits imposed by formalization and remember that people are guided by intuition and passion as well as logic (7).

Scenarios are analytical tools used to represent and deal with qualitative or unquantifiable uncertainties. Policy-making is certainly full of uncertainties (8) and there is no single uniform approach, but there are number of broad steps or stages which can generally be applied. Part of the policy-making process includes "identifying the options" and "considering the impacts" (9), both purposes that this paper seeks to accomplish.

A thorough examination of the current state of the debate in each EU country was conducted and is displayed in the OpenForum Academy's Net Neutrality Country Factsheets research[1]. An overview and classification of the different trends and identification of variables in the regulatory approaches has led to the definition of a set of policy scenarios. A PESTLE analysis tool is used to identify and focus issues that affect the market players in the policy scenarios and be identified as forces that drive the market evolution.

Information gathering for both the definition of the starting scenarios and the identification and assessment of driving forces are based on interviews with experts and bibliographical review.

The interviews were conducted during the months of July and August of 2013; they were conducted either in face-to-face or through a phone conversation. The same set of questions was asked to all participants; the last question always gave the interviewee the chance to add any comment he/she might feel was important to add and all experts were asked if they noticed there were any questions missing from the interview and given then the chance to address it.

[1] See OpenForum Academy's Net Neutrality Country Factsheets available at: http://www.openforumacademy.org/library/ofa-research/OFA%20Net%20Neutrality%20in%20the%20EU%20-%20Country%20Factsheets%2020130905.pdf

The questions were structured in four sections: one dealing with the draft of the Regulation for a European single market for electronic communications that had been made available on July 11[2], two sections dedicated to the effects of "negative differentiation" and "positive differentiation" respectively (as per defined by BEREC) (3) and a fourth section dedicated to market and innovation. Finally, the experts were informed of the research approach through a PESTLE analysis and were asked to, according to their experience and insight, rank the driving forces according to their nature and how much of an impact they will have in determining the evolution and dynamics of market, stakeholders and the ecosystem. If ranking all six categories was deemed impracticable, they were asked to at least highlight one or two which the expert would consider to have the most weight in the future evolution of scenarios.

The experts that have participated in the interviews are:

- Pearse O'Donohue (Deputy Head of Cabinet – Vice President Neelie Kroes)
- Mischa Prinsen (Ministry of Economy, Government of the Netherlands)
- Andrea Renda (Center for European Policy Studies)
- Jorge Pérez (Universidad Politécnica de Madrid)
- Luigi Gambardella (ETNO)
- Marco Pancini (Google)
- Christoph Steck (Telefónica)
- Caroline de Cock (VON Europe)
- Guillermo Beltrá (BEUC, The European Consumer Organisation)
- Lee Hibbard (Council of Europe)
- Chris Marsden (University of Sussex)
- Oliver Gajda (European Crowdfunding Network)
- James Waterworth (CCIA)
- Tim Rhodes (Canary Software Limited)

These experts are knowledgeable in the matter of net neutrality and/or other specific issues like market and innovation, human rights, and policy and regulation. They represent a wide variety of views and belong to different interest groups, including academia, private sector, users and government. They also represent different perspectives on the issue, including different policy approaches to net neutrality regulation, companies in different links of the internet value chain and different experiences in the online market.

Their answers and comments throughout the one-hour long interviews were used to gather information, references and perspectives. The experts have not been quoted in this paper, although position papers published by their organizations, academic papers published by them and official documents citing them have been included in the bibliography and quoted in the text.

A series of public consultations have been launched in the EU:

[2] Later, on September 9th, the final text of the "Proposal for a Regulation of the European Parliament and of the Council" was published.

- June 2010, European Commission Consultation 'The open internet and net neutrality in Europe';
- October 2011, BEREC public consultation on its draft Guidelines on Net Neutrality and Transparency;
- May – December 2012, BEREC conclusions: “BEREC Guidelines for Quality of Service in the scope of Net Neutrality”, BEREC: “An assessment of IP-interconnection in the context of Net Neutrality”, and “BEREC Report on differentiation practices and related competition issues in the scope of net neutrality”;
- July 2012 European Commission consultation on "specific aspects of transparency, traffic management and switching in an Open Internet".

The publicly available responses to the EU consultations have been included in the material to be read and considered part of the wide range of perspectives worth taking into account for the prospective evolution of policy scenarios. Having compiled and read over a hundred papers (academic papers, position papers, reports, legal documents), the bibliographical review can be considered extensive and thorough; an annex with over fifty cited works is included in this paper.

POLICY SCENARIOS

Policies on net neutrality

The policy scenarios describe feasible states of policy and regulation within the European Union regarding the issues on net neutrality. Scenarios are not complete descriptions of the system: they include only factors that might strongly affect the outcome of interest.

An analysis of present strategies and trends in Europe helps identify what policy scenarios are plausible. The regulation of network neutrality needs to be understood in the context of the overall regulation (or lack of regulation) of the internet and of broadband internet access in general (10). On September 9th, a "Proposal for a Regulation of the European Parliament and of the Council"[3] was published, including references to "net neutrality" in the Preambles and specifically dealing with the issues in Articles 23-25. In general terms, Article 23(5) will ban blocking, slowing down and degrading unless such restrictions are necessary to: "a) implement a legislative provision or a court order, or prevent or impede serious crimes; b) preserve the integrity and security of the network, services provided via this network, and the end-users' terminals; c) prevent the transmission of unsolicited communications to end-users who have given their prior consent to such restrictive measures; d) minimize the effects of exceptional congestion provided that equivalent types of traffic are treated equally."

The proposal specifically allows "providers of content, applications and services and providers of electronic communications to the public" to freely "enter into agreements with each other" for the provision of specialised services (Article 23(2)). In addition, National Regulatory Authorities (NRAs) shall have the power to impose minimum non-discriminatory quality of service requirements (Article 24(2)).

Shortly before the official release of the proposal, European Commission Vice President Neelie Kroes's blog featured a post called "Safeguarding the open internet for all"[4] in which she argues in favour of premium services and their role in promoting investment and increasing consumer choice.

This move on behalf of the European Commission is taking place not long after other two EU countries have enacted a law to deal with this. On May 8th, 2012 The Netherlands adopted a legislative proposal amending the Telecommunicatiewet (Telecommunications Act), thereby laying down the principle of net neutrality (Article 7.4a) in Dutch law (11). Since the beginning of 2013 a new law governing electronic communications is in effect in Slovenia;[5] Article 203 of said law explicitly requires net neutrality.[6]

[3] See https://ec.europa.eu/digital-agenda/en/news/regulation-european-parliament-and-council-laying-down-measures-concerning-european-single

[4] See http://blogs.ec.europa.eu/neelie-kroes/open-internet/

[5] See ZEKom-1: http://www.uradni-list.si/1/content?id=111442

[6] See unofficial translation of Article 203, Electronic Communications Act: http://www.scribd.com/doc/144614369/Slovenia-Net-Neutrality-law-2012#download

According to OpenForum Academy's Net Neutrality Country Factsheet[7], most European countries have at least adopted an official position on net neutrality, be it by contributing to the European Commission's public consultations or by launching a national debate; some countries have moved on to providing guidelines for the industry (France, Austria, Denmark), launched a voluntary code of conduct (United Kingdom) or reached a co-regulation solution (Norway).

Some consider that the European regulatory framework for electronic communications is capable of handling network neutrality issues, provided that there is competition in the telecommunications market and together with law enforcement (Czech Republic, Spain) or expect the European Commission to lead, favouring a harmonized approach within the European Union (Ireland, Italy). Belgium has a law proposal, Luxembourg's Parliament adopted a motion calling for net neutrality to be enshrined in national legislation and the German Minister of Economy announced a net neutrality law in Germany.

Transparency obligations

Providers of electronic communications may fail to tell customers and application developers which services they offer –estimated bandwidth, latency, etc. This is essential to certain applications, which cannot run with latency, or which are blocked or filtered. In the US, where the debate on net neutrality started, when the FCC established the four general, non-obligatory principles that determined the rights of users in internet access and sought to "preserve and promote the open character of the internet," the first rule dealt precisely with transparency:

"*A provider of broadband internet access service must publicly disclose accurate information regarding the network management practices, performance, and commercial terms of its broadband internet access services sufficient for consumers to make informed choices regarding use of such services and for content, application, service, and device providers to develop, market and maintain internet offerings.*"[8]

The revisions to the EU regulatory framework in 2009 included an amendment of Article 20 of the Universal Service Directive to oblige providers of electronic communication services to inform their end users of their practices in regard to traffic management (10).

There is a general consensus around the need for transparency in the traffic management techniques employed by the providers of electronic communications. The obligation to be transparent is already incorporated in the EU regulatory framework.

However, there are different perspectives on what role transparency can play in shaping the internet strategy. Efforts to improve transparency raise concerns. Specifically, there are questions over:

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[7] Available at: http://openforumacademy.org/research/OFA%20Net%20Neutrality%20in%20the%20EU%20-%20Country%20Factsheets%2020130905.pdf

[8] FCC Open Internet ruling. US FCC, Report and Order, In the Matter of Preserving the Open Internet; Broadband Industry Practices; GN Docket No. 09-191, WC Docket No. 07-52, 23 December 2010

- consumers' ability to understand and determine the extent of traffic management practices, and their impact on their internet access;
- which part of the online chain is at fault (for example, broadband provider, content provider or end users' equipment and software);
- what is genuine traffic management and what is unfair practice.

The UK's public body Consumer Focus cites lack of awareness of traffic management among consumers, a poor understanding of internet terminology in general and the way in which information is presented as issues to be taken into account. Its recommendations include raising awareness to enable consumers and improving accessibility and comprehensibility of the information (12) . The European Consumer Organisation (BEUC) goes further and argues that consumers already have expectations of what an access to internet constitutes and highlights that "ISPs may impose broadband caps or subject usage to a *fair usage policy* which is contrary to consumers' expectations of unlimited access"(13).

Network management practices

Operators have a wide range of management techniques at their disposal. Two categories can generally be distinguished[9]: those of a technical character, managing and shaping traffic to prevent or respond to congestion, and those of an economic nature, linking access fees to resources consumed by users (volume, service quality, etc.) (1).

Most agents have admitted the need for a certain amount of traffic management on behalf of the operators to handle security, congestion and efficiency problems.

Negative differentiation

BEREC defines negative differentiation as "a degradation of delivery (e.g. lower priority) to push content and application providers to the paid service, to lower electronic communication providers' production costs or to hinder a competitor's service".

In 2009, the FCC proposed a set of reasonable and unreasonable practices by way of example;[10] techniques considered unreasonable included the degradation or blockage, in order to reduce congestion, of particular traffic (VoIP, for example) and not traffic with equivalent consumption or quality of service (QoS); or the blockage or degradation of traffic on the basis of its content, if it is not justified that this harms users of networks.

Blocking, slowing down or degrading specific services or services classes falls under this group of traffic differentiation, which, even by definition, implies an undesirable behaviour which BEREC links to "causing harm to consumer welfare, competition in the different markets, and innovation", since these "practices might be used by operators to extend or maintain a position of strength in the market" (14).

[9] A division made in the Canadian framework CRTC (2009) *Telecom Regulatory Policy CRTC 2009-657. Review of the Internet traffic management practices of Internet service providers*, October 21, 2009. Available at http://www.crtc.gc.ca/eng/archive/2009/2009-657.htm

[10] See paragraph 137 of FCC (2009), *Notice of Proposed Rulemaking in the Matter of Preserving the Open Internet and Broadband Industry Practices*, GN Docket No. 09/191 and WC Docket No. 07/52 (NPRM), October 22, 2009

According to BEREC, there are current restrictions on peer-to-peer and/or VoIP traffic in the EU (3). Less common examples of restrictions include restricted access to specific applications (such as gaming, streaming, e-mail or instant messaging service) and, to a much lesser extent, on access to specific content and application providers.

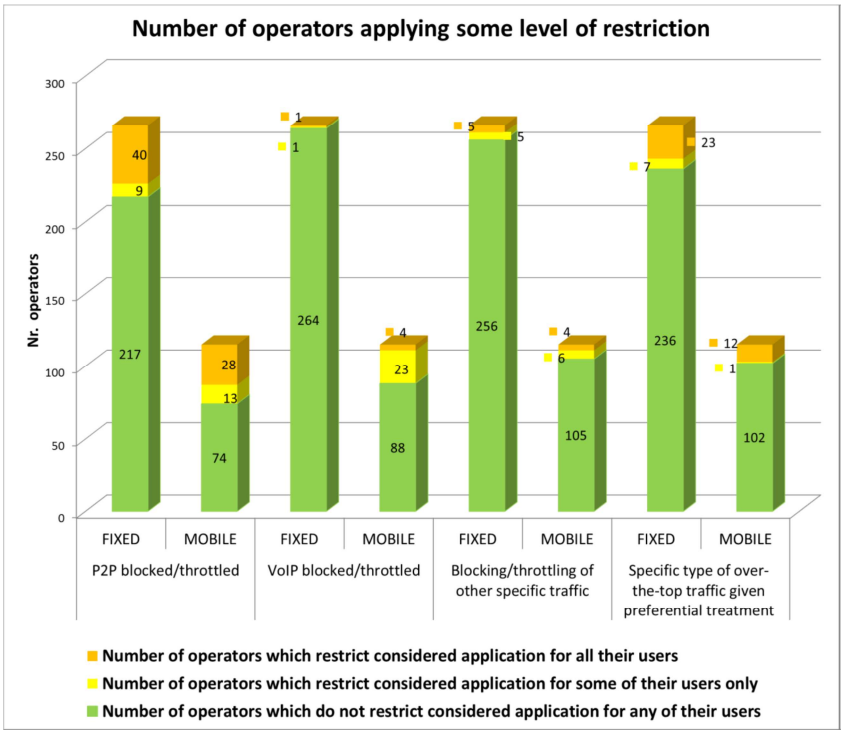

Figure 1: Number of operators applying some level of restriction
Source: BEREC & EC 2012 A view of traffic management and other practices resulting in restrictions to the open internet in Europe

The Netherlands and Slovenia have both regulated against these kind of traffic differentiation:

"providers of public electronic communications networks via which internet access services are delivered and providers of internet access services shall not hinder or slow down applications or services on the internet" (Article 7.4a, Dutch Telecommunications Act).

"*Network operators and providers of internet access services use their best endeavours to preserve the open and neutral character of the internet, by being forbidden to restrict, delay or slow the internet traffic at the level of individual services or applications, or to implement measures for their devaluation*" (Article 203(3), Electronic Communications Act in the Republic of Slovenia).

The first draft of the Regulation for a European single market for electronic communications[11] also includes a ban on this type of traffic differentiation: "*Within the limits of any contracted data volumes or speeds, providers of electronic communications to the public shall not restrict the foregoing freedoms by employing traffic management practices solely or primarily to block, slow down or otherwise degrade specific services or applications, or specific classes thereof.*"

[11] Available at http://edri.org/files/consolidateddraft-ISC070713.pdf

The guidelines for internet neutrality (15) drawn by the Norwegian Post and Telecommunications Authority are based on a voluntary agreement between stakeholders hold three principles, one of which is that "internet users are entitled to an internet connection that is free of discrimination with regard to type of application, service or content or based on sender or receiver address."

However, these practices can be used for legitimate reasons. The laws enacted in The Netherlands and the Republic of Slovenia, the draft text of the European Commission and the Norwegian guidelines all contain exceptions under which traffic discrimination is authorized (e.g. implementing a court order, preserving the integrity and security of the network, minimizing the effects of exceptional congestion).

Positive differentiation

BEREC defines positive differentiation as "the offer of a *premium* service compared to the current best effort delivery (e.g. prioritised handling of live video; out-of-cap data delivery)".

Product differentiation can be a legitimate commercial choice for undertakings seeking to make their services more attractive than their competitors', and differentiation can thus increase consumer choice and consumer welfare. However, positive differentiation (higher priority, out-of-cap delivery, etc.) to the benefit of specific CAPs would raise concerns around some CAPs not being able to enjoy the same conditions of delivery as the favoured content, even if they were willing to pay the corresponding price.

According to BEREC, some operators have reported practices of "positive differentiation" of specific traffic (see Figure 1) (3). Recently, Deutsche Telekom spurred the debate on net neutrality by announcing strict data caps on home users' internet downloads by 2016, but exempting its own TV service, called T-Entertain (IPTV) (16).

The Dutch and Slovenian provisions on net neutrality demand that electronic communication providers make no traffic discrimination, neither negative nor positive differentiation.

The generalization of user-based or application-based prioritization on internet access service can result in a degradation of the general performance of the standard (non-prioritised) internet access service below an acceptable level.

Specialised services

BEREC considers that specialised services are usually provided in order to ensure adequate service characteristics and they make the case that specialised services can be provided in a way that is not at the expense of internet access service offers.

These are measures put in place by operators in order to implement specific business models, either concerning the bundling of specialised services with internet access, or with respect to data volume pricing.

Some providers of electronic communication services offer specialised services, which differ from (public and best effort) internet access service in that they provide a generally guaranteed quality of service and might be open only to specific content and application

providers. The most frequent applications offered are Voice over IP (VoIP), IP Television (IPTV) and Video on Demand (VoD). The use of these specialised services might affect the internet access service in some cases, due to the sharing of access resources:

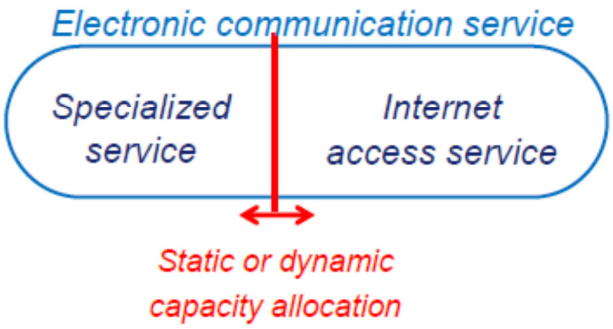

Figure 2: Sharing of access resources. Source: BEREC

The BEREC 2012 study reveals that 35% of the fixed operators manage their networks in order to offer specialised services (3).

Both the Dutch and the Slovenian law allow managed services. The risk implied in the fact that specialised services and the internet access service share the same broadband connection is acknowledged and, although deemed "questionable", the Dutch position is to call for monitoring of the issue and identification of possible need of additional measures.

Service levels for the broadband internet access services

Since specialised services and internet access services are sharing the resources, there are doubts as to how electronic communication providers choose to allocate the capacity. There are different ideas on how to guarantee that the internet access service doesn't "become a dirt road".

Both the laws in The Netherlands and Slovenia, as well as the leaked text, foresee the possibility of NRA establishing minimum service levels for the broadband internet access service, should it prove to be necessary (that is, if ISPs are allocating more or all of the capacity for specialised services). Until then, monitoring and examination are advised.

Singapore has established a minimum QoS. The Dutch and the Slovenian law, as well as the EC text, include a provision so that the NRAs can establish minimum levels of service, if need be.

Description of policy scenarios

All scenarios include transparency obligations. Each represents a different combination of identified trends: ban on traffic differentiation (voluntary or by law), development of specialised services and the establishment of a minimum QoS.

Policy scenario 1 (which will be referred to as "market") lets players evolve under conditions of transparency and market competition. In such a scenario, there is no code of conduct or voluntary adherence to a non-discrimination principle; specialised services can be developed and capacity allocation can be freely managed by telecommunication operators.

Policy scenario 2 (which will be referred to as “code of conduct”) considers the case of market players voluntarily signing a code of conduct or industry agreement not to perform traffic discrimination. No specific legal framework requires this of the telecommunication operators and specialised services can be developed and capacity allocation can be freely managed by telecommunication operators.

Policy scenario 3 (which will be referred to as “law”) is different from the previous scenario (“code of conduct”) in that no discrimination is a legal requirement imposed to the telecommunication operators.

Policy scenario 4 (which will be referred to as “guarantee”) adds to the previous scenario the requirement that a minimum capacity always be allocated for the open internet access service, in case the business models around specialised services incite a progressive disappearance of basic internet access service.

Policy scenario 5 (which will be referred to as “open”) bans traffic discrimination and specialised services, forcing all services to be open, mostly best-effort and non-discriminative.

	No discrimination (voluntary)	No discrimination (law)	Specialised services	Minimum QoS
Policy 1: “Market”			■	
Policy 2: “Code of Conduct”	■		■	
Policy 3: “Law”		■	■	
Policy 4: “Guarantee”		■	■	■
Policy 5: “Open”		■		

DRIVING FORCES

Through a PESTLE analysis, a set of driving forces have been identified. These forces will be present in some or all of the policy scenarios, depending on what limits they impose. This chapter discusses how these forces will contribute to shape the market evolution in each of the identified policy scenarios.

Assessing how these incentives, trends and drivers will impact the market is a difficult task. A bibliographical review (that includes SWOT and cost/benefit analysis), interviews with experts and careful examination of current policy impact analysis conducted by policy makers have been taken as a basis.

In this chapter, all of the identified forces have been taken into account and studied within the context of the net neutrality debate; the impact of this force in each scenario has been identified, and an assessment of how relevant this force is a driver in the market has been made.

A prospective analysis is useful for decision makers and to identify possible future problems. However, it must be noted that "broadband is full of puzzles and paradoxes" (17) and that the internet has evolved over time, and it will continue to evolve in unexpected ways (18).

PESTLE analysis

PEST analysis (Political, Economic, Social and Technological analysis) describes a framework of macro-environmental factors used in the environmental scanning component of strategic management. Some analysts added Legal and Environmental factors expanded it to PESTEL or PESTLE. It is a part of the external analysis when conducting a strategic analysis or doing market research. It is a useful strategic tool for understanding market growth or decline, business position, potential and direction for operations.

No environmental factors have been considered a driving force and have been left out. Although the growing importance of environmental or ecological factors have given rise to green business and encouraged widespread use of environmental factors in strategic decision-making, these issues would remain constant and equal in all policy scenarios for net neutrality. No experts considered environmental factors to have any weight at all in either the definition or the evolution of policy scenarios, nor were they mentioned in the different responses to public consultations, academic papers, position papers or industry reports. While environmental considerations could certainly drive innovation or market, also online, these trends do not influence the likely evolution of the ecosystem differently for each or any of the defined policy scenarios.

For each factor, a discussion is included as to how this force is created and how it affects the market players; for each particular scenario, a given factor can push in a different direction or have different constraints. These effects are accompanied by an assessment of how relevant they are (assigning weights), which will determine how these factors finally add up to configure prospective market states.

Determining the impact of each force onto the market and market players also includes a reflection on how it affects **innovation**. A discussion on this particular included as part of the PESTLE analysis.

POLITICAL

The political factors have been considered heavily for the purpose of identifying the scenarios. Since this discussion aims at seeing how the other factors contribute to reshape the market once a regulatory approach has been established, the discussion on political factors will not lead to driving forces in this analysis. Should these factors push, in any of the scenarios, for a new regulatory approach, we would simply be looking at one of the different scenarios (or a new one that has not been considered).

Political harmonization

"The benefits arising from a single market for electronic communications will extend to the wider digital eco-system including EU equipment manufacturers, content and application providers and the wider economy, including sectors such as banking, automobile, logistics, retail, energy, transport, who rely on connectivity to enhance their productivity through, for example, ubiquitous cloud applications, connected objects and possibilities for integrated service provision for different parts of the company."[12] The European Commission and most of the consulted experts have made it clear that harmonization is important within the EU; recent actions in Europe, namely the laws on net neutrality enacted by The Netherlands and Slovenia, as well as announcements made in other countries, can be seen as a fragmented approach to net neutrality unless harmonization happens at the EU level.

However, it must be noted that, although harmonization has a positive effect for the European markets, this should not take priority over which legislative measures are put in place. The Council of Europe has promoted an initiative to work on a soft law instrument[13] to guide member states in the application of net neutrality rules that support particularly the aspirations of Articles 6/8/10 of the Convention (19); as far as the net neutrality debate affects human rights issues, these considerations should be above any other political or economic considerations.

Policy shaping

There has been a great amount of innovation and a great variety of online services and applications have flourished on the internet. The European Commission[14] considers "the provision of connectivity through electronic communications networks and services" to be of much "importance to the wider economy and society, as a general purpose technology." It is not the first time that we are certain that internet will play a big role (as it does), although we may not exactly know how. The European Commission cites, in 2013, e-government and e-

[12] See first draft of the Regulation made available: Available at http://edri.org/files/consolidateddraft-ISC070713.pdf

[13] See "A Discourse-Principle Approach to Network Neutrality: A Model Framework and its Application", by Luca Belli and Matthijs van Bergen. Available at http://nebula.wsimg.com/a0d2191d5788b8177915108786bfba7a?AccessKeyId=B45063449B96D27B8F85&disposition=0

[14] EC – Leaked Regulation

health services as beneficiaries of the digital eco-system and this is not news. Back in 2003, Odlyzko stated that "we know even less about what we will do with broadband when we have it. The standard list of applications [...] consists of e-education, e-medicine, e-government, e-commerce, and e-entertainment. Those are the same applications that were touted as reasons for building the "Information Superhighway" a decade ago" (17).

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<tr><td>Interested market players pushing for this policy scenario</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4">OTT established players pushing for these policy scenarios</td><td></td></tr>
<tr><td></td><td colspan="4">Political institutions demand non-discrimination</td></tr>
<tr><td></td><td></td><td colspan="3">Political timing: a good moment for "action" (regulation)</td></tr>
</table>

ECONOMIC

The economic factors include all the incentives that shape the market from an economic point of view, be it intuitive business models, incentives for certain behaviours, changes in the costs of providing a service or interest in investment.

Transparency can be the outcome of the market development (demand driving the economic operators to be more transparent) or a legal requisite (according to Articles 20 and 31 of the Universal Service Directive, national regulatory authorities can oblige service providers to publish transparent, comparable, adequate and up-to-date information); in any case, the fact that companies are being transparent about their traffic management techniques plays a role in shaping the market.

On the other hand, the development of business models based on data caps and service agreements has an effect in the market: it can reshape the content and application ecosystem and influence user behaviour.

Competition is an underlying factor in both these issues and will be treated as such. It has been noted that access-based competition has generated less concentrated retail broadband markets than in the US, thus providing a far different framework for the debate in Europe (20). This is relevant because competition in the 'local loop' or 'last mile' to the end-user subscriber

provides a choice of platform (21), and therefore rigorous telecoms competition regulation could be an important driving force shaping the scenarios. However, others[15] state that the market in the US is, in fact, more competitive, as can be proved by the deployment of infrastructure (22).

To study the economic forces influencing the development of the market, it is necessary to look at the role of the market players and their incentives.

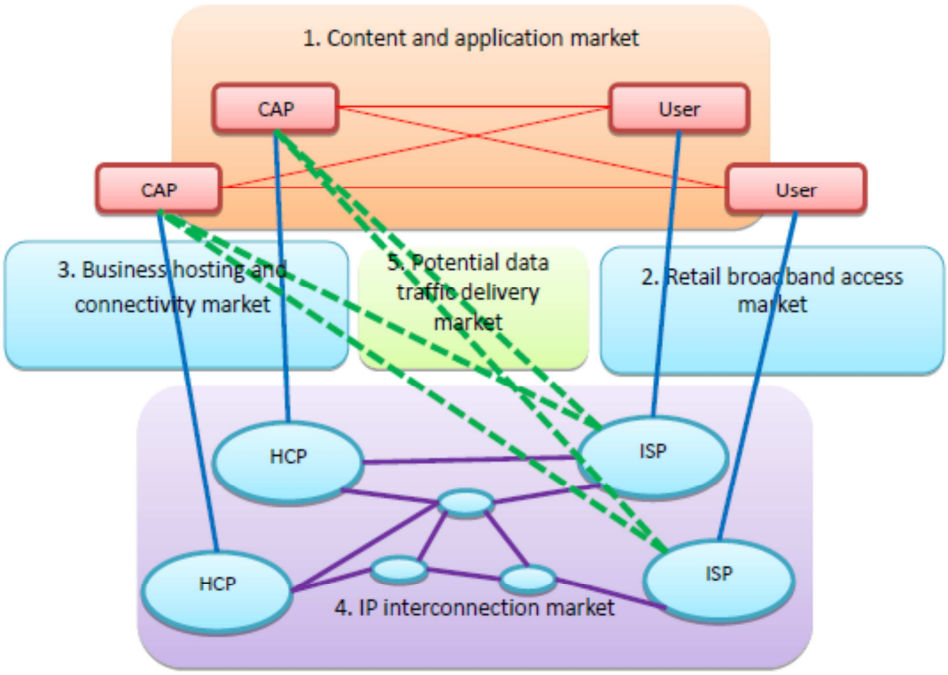


Figure 3: Markets in the Internet Value Chain
Source: RTR Position Paper (Austria, 2013)

The business models that support the market and the interaction between players will be key issues, such as the appearance of termination fees to content providers or the alliances of stakeholders in different links of the value chain. Looking at the leverage that some players hold and the different roles will be relevant in determining the driving forces. This includes user's behaviour and expectations.

Finally, for some policy conditions it will be relevant to look at business incentives in the way that stakeholders decide to allocate their resources.

Transparency

Customer demands do not ensure transparency. While legal /regulatory demands have an impact in the ISPs' behaviour, it is necessary to achieve effective monitoring and oversight of traffic management practices for the users and NRAs to be able to evaluate and react.

Transparency is crucial for most scenarios; the more choices available, the more important it is that ISPs develop a clear, direct language for communicating what their offers will ensure.

[15] [Reference]

End-users want to have information on what they pay for (23); however, according to some of the experts interviewed, users are not sufficiently educated and informed to make choices that correspond to what they want. The amount of research a user is willing to do is limited; consumer expectations[16] need to be taken into account. Even if users had a clear knowledge of the traffic management techniques to which their service is subject, they don't have any reliable mans in order to appreciate the extent to which their connection is throttled, filtered or blocked (23).

Transparency is always coupled with competition in order to be a significant driver force in the market. However, competition in the telecommunications sector varies greatly from some countries to others, within Europe. Competition between ISPs is limited by both geographical scale and feature-price scope (24). In policy scenario 1 there seems to be a need for further work on switching, as most stakeholders seem to agree on. On this issue, Ofcom states: "Where consumers are entering into a long-term contract, and it is not possible to provide an appropriate level of information on traffic management policies at the point of sale, we encourage ISPs to provide a cooling-off period offering consumers the ability to terminate the contract or to change to a package that better suits their needs without having to pay additional costs. Many ISPs have already introduced a 30-day period that enables the consumer to cancel their broadband if they are not happy with the service*"* (25).

<table>
<tr><td>P.S. 1 "Market"</td><td>P.S. 2 "Code of Conduct"</td><td>P.S. 3 "Law"</td><td>P.S. 4 "Guarantee"</td><td>P.S. 5 "Open"</td></tr>
<tr><td>Transparency is the driving force in this scenario, together with competition (switching, voting "with their feet")</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td colspan="3">Need for clear language (that conforms to common understanding) to distinguish the basic internet access from the specialised service</td><td></td></tr>
</table>

Transparency and competition have been cited by many as being enough to guarantee the principle of net neutrality. The argument goes that users demand access to content and applications and will "vote with their feet" (26), rejecting the internet access offers that exclude or discriminate against content that is valuable to them.

Transparency plays a big role in shaping the competitive market in Policy Scenario 1 and will act as a main driving force. With a ban on traffic discrimination (either voluntary or enforceable by law), the role of transparency is downplayed. However, as long as the telecommunication operators are offering simultaneously basic internet access and specialised services (Policy Scenarios 2, 3 and 4), the user's ability to understand and choose among the different offers will help shape the market.

[16] "ISPs may impose broadband caps or subject usage to a *fair usage policy* which is contrary to consumers' expectations of unlimited access." (13)

Bundling and vertical integration

The need to differentiate their services and escape becoming a commodity pushes ISPs to either integrate vertically or create alliances with online service providers. If these alliances are formed with the intention of attracting customers, they will tend to choose already established, widely adopted online services.

Vertical integration in ISPs in order to offer online services to their customers creates incentives for ISPs to discriminate against competitive services. It also makes the "chosen" online services stronger: they get more publicity, benefit from network externalities and can find a comfortable environment to grow their customer base.

Creating alliances with online service providers, or vertical integration, can be transformed into an offer for the end-user in a variety of ways. Some kinds of positive discrimination have nothing to do with how the traffic is prioritised, but instead with how that certain traffic is charged. For example, Bharti Airtel (in India) has partnered with Google to launch a service "Free Zone", where subscribers will be able to access Google services such as Gmail, Google+ and Google search on their mobile phones without any data cost (27). Telefónica's alliance with Spotify allows users get a 40% discount on a Spotify Premium account (28). Deutsche Telekom announced was that it would impose strict data caps on home users' internet downloads by 2016 but would exempt its own IPTV service (T-Entertain) (16).

Carriers are thus already offering exclusive, preferential treatment to one application provider over others. This creates something similar to a "walled garden" of preferred suppliers (21), although, in this case, the "walls" are notably shorter than in the case of negative discrimination.

The FCC's Open Internet Advisory Committee finds it hard to evaluate how these strategies will affect the market: "Open questions on how data caps, tiers and user-based pricing can shape other providers of services in broadband ecosystem, e.g., entrepreneurs who provide applications, build web pages, and operate other services in the cloud" (Open Internet Advisory Committee FCC, 2013).

The possibility of using already existing widely spread and appreciated online services with a better quality of experience can be very attractive to users; sometimes, more so than the ability to engage with any potential new online services that may come up in the future. This could drive the demand towards specialised services in detriment of internet basic service and affect how resources are allocated by the ISP.

Some of the most successful CAPs rely on reaching a large user base. These business models can be of great help for medium-sized players who are trying to compete with the bigger, established online service providers; they can also be used by the bigger players to raise entry barriers to other players. In both cases, this seems to favour the tendency of the content and application market to shape into an oligopoly with few players that hold a large user base and benefit from network externalities.

Additionally, it could lead to a lock-in effect, in which the user optimizes their usage of a particular online service if they continue to use a particular ISP's connection; alternatively, the

user is pushed towards the use of a particular online service because of the ISP they have chosen.

P.S. 1 "Market"	P.S. 2 "Code of Conduct"	P.S. 3 "Law"	P.S. 4 "Guarantee"	P.S. 5 "Open"
Exclusionary conduct; lock-in effect; alliances				

The extent to which bundling and vertical integration can be decisive in the development of the different scenarios depends on how much it can affect the current relationship between current market players. In the "open" scenario (Policy Scenario 5), in which no traffic prioritisation or specialised services are possible, this is not expected to be a driving force. However, as long as specialised services are offered by the telecommunication operators (all other scenarios), how market players come together to make offers will certainly affect and reshape the market structure; this will become a driving force in "market", "code of conduct" and "law" (Policy Scenarios 1, 2 and 3) and will have some effect in Policy Scenario 4, in which the established minimum ("guarantee") limits the effect that said bundling can have on the types of services that market players and their alliance can offer the users.

Business models

Many of the business models that have been successful in the online ecosystem consist of services and applications that are directed at the end users but do not have them (all) as customers. Most of these services also tend to try to reach to a very wide audience: "the Web is all about scale, finding ways to attract the most users for centralized resources, spreading those costs over larger and larger audiences as the technology gets more and more capable" (29). However, if users are not paying for these services, someone else definitely is. "Technology is giving companies greater flexibility in how broadly they can define their markets, allowing them more freedom to give away products or services to one set of customers while selling to another set" (29); "freemium", cross-subsidies and advertising are some of the common strategies for online content and application providers.

Free services, open source software, user-generated content freely available and peer-to-peer networks bringing down the cost of distributing content have contributed to create to a culture in which "users increasingly expect a level of unfiltered access to *free* content on the internet" (21). Internet access services, however, are not free; users have to pay for these services, but electronic communication providers are pressured by the permanent expectation that bandwidth should increase and prices decrease for their internet access service.[17]

For the electronic communication providers, it is important to develop differentiation strategies. High-speed internet service providers are selling bundled triple play services (voice, video, data) and are contemplating deployment of end-to-end classes-of-service (tiered services) together with associated pricing incentives (30). Additionally, the electronic communication providers hold a special value in the value chain: termination. "Since broadband ISPs have a termination monopoly or duopoly over the end-user, they can use that to charge termination fees to those who wish to get access to the user" (21). Thus, the same

[17] Fixed broadband prices have dropped by 82% between 2008 and 2012 worldwide (53).

way that other online service providers have been redefining their markets, the internet service providers could explore ways to offer cheaper services to the end user at the expense of those who want to reach the end users. In 2010, César Alierta, President of Telefónica, was quoted saying that companies such as Google, Yahoo and Microsoft (Bing) use the operator's network free of charge, but that this relationship could not continue for much longer (31) and Ed Whitacre, AT&T's then CEO, was quoted referring to AT&T's internet infrastructure: "Now what they would like to do is use my pipes free, but I aint't going to let them do that because we have spent this capital and we have to have a return on it" (32).

The bigger issue is the need for investment in infrastructure. Policy makers in Europe are convinced that fast and ultra-fast internet access is relevant for the region's competitiveness and growth (33) and are pressuring electronic communication providers to deploy more advanced networks. According to A.T. Kearney's report on Internet Value Chain Economics:

"Online services and some categories of hardware and software at the user interface show high concentration, rapid growth and high returns, which are reflected in the market capitalization of their leading players. Content rights and connectivity are less concentrated globally and earn returns around 10 to 15 per cent, but their market capitalizations have stagnated as investors weigh high capital requirements against continued margin pressure." (34)

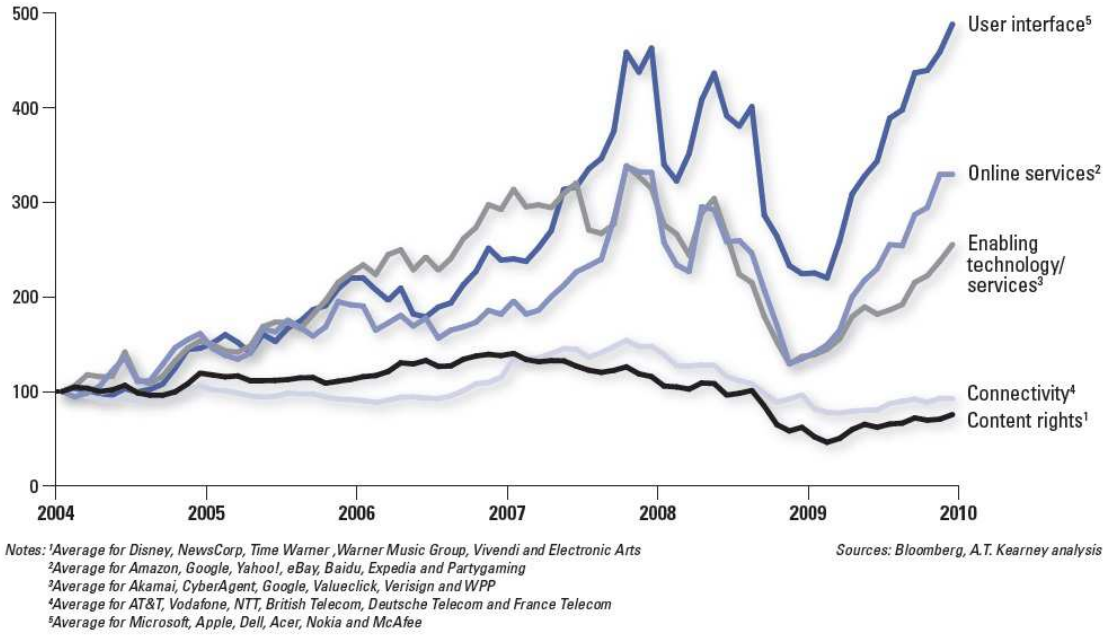


Figure 4: Evolution of market capitalization by value chain market.
Source: (34)

The deployment of Next Generation Access Networks and the investment in infrastructure is good for all the market players, for the end users and for the overall evolution of Europe. For the internet service providers, it is important to look at the demand and the user's willingness to pay in order to figure out what kind of return on the investment they will have.

The rich ecosystem of online services has played a big role in broadband adoption: "over-the-top applications, by increasing demand for more ubiquitous, higher capacity higher speed networks, support rather than hinder the Digital Agenda goals" (35). Examples of both fixed and mobile, both in the US and in Europe, seem to support the idea that there is a "virtuous cycle" in which connectivity spurs innovation of applications and content, while encouraging users to adopt technologies and promoting further investment in the networks (18). However, if networks and commercial content providers cannot monetize their respective parts of the value chain, network effects can reverse into a vicious circle, in which neither content nor network can secure investment to provide service (21).

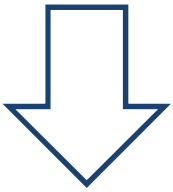
The behaviour of users drives electronic communication providers to look at other players as possible customers. "In terms of pricing, this would imply that content and application providers (such as Google, Yahoo, MSN, or Disney) would be forced to pay the residential consumers' internet service provider to ensure that the consumer can access their services" (36), which essentially means introducing the potential of a two-sided market pricing.

The unique position of the electronic communication providers in the value chain (with competition in the last mile often being a monopoly or duopoly) has had them labelled as potential gatekeepers[18] who may hold the final say in which content and applications can reach the end user. On the other side, "[Tim] Wu predicts that market forces will help keep new pricing or throttling regimes from getting out of control. For example, if ISPs try to charge Google to carry its data, Google could charge the ISP for the privilege" (37). As the different stakeholders have been exploring business models and dealing with their respective leverage, there have been already some examples of such behaviours. The Wall Street Journal featured recently an article declaring that "several big Web companies including Google, Microsoft and Facebook are paying major broadband providers for connections to get faster and smoother access to their networks" (38). In 2007, when Apple initially released the iPhone in the US, Steve Jobs had negotiated with AT&T: "in return for five years of exclusivity, roughly 10 per cent of iPhone sales in AT&T stores, and a thin slice of Apple's iTunes revenue, AT&T had granted Jobs [...] a unique revenue-sharing arrangement, garnering roughly $10 a month from every iPhone customer's AT&T bill" (39). In Europe, the iPhone was launched in Europe: in the UK, sales went through the UK O2 unit of Telefónica; in Germany, it was offered through Deutsche Telekom's T-Mobile division; in France, through the operator Orange.

The fact that the incentives exist for market players to leverage their positions and find new sources of revenue is confirmed by their behaviour. However, it must be noted that incentives in the opposite direction continue to exist: in the US, "Verizon, which has invested in fibre to the home and will complete LTE rollout in 2013, views demand and traffic growth – including that driven by over-the-top applications – as an opportunity rather than problem" (35). After all, "the killer application of the internet is speed" (17).

[18] To cite a few: Isabella Krell from the New Media & Society at Cornell, the Open Internet Coalition, and Barack Obama when he was a presidential candidate in 2008

- Incentives to explore new business models; this may include:
  - positive discrimination,
  - blocking of rival services,
  - leverage of gatekeeping position



- Market forces: other players have leverage, too
- Meeting the demand: speed and access to online content and applications

The Cisco® Visual Networking Index (VNI) Forecast (2012-2017) projects that global Internet Protocol (IP) traffic will grow three-fold between 2012 and 2017, highlighting an increased global use of video services and applications. This goes to show a need for more speed and better infrastructure.

Electronic communication providers, however, are not the only ones working in that direction. "Companies such as Akamai, Level 3 and Limelight already successfully quality based content delivery to Over the Top players/Content Providers. Moreover, Google has built the largest worldwide IP backbone to improve the quality of its delivery" (40). This contributes to reduce end-to-end bandwidth required of the carrier's network in order to improve the user experience, and consequently minimize the need for the carrier to invest in backbone and exchange capacity.

P.S. 1 "Market"	P.S. 2 "Code of Conduct"	P.S. 3 "Law"	P.S. 4 "Guarantee"	P.S. 5 "Open"
			Non-tiered access to online services driving the demand for internet broadband service	
Monetizing the investment: fees to online services, alliances with CAPs, tiering users				

The incentives to explore new business models and reshape the market with alternative ways to monetize the investment is relevant in all but the "open" scenarios; it will have a bigger weight in the "market" (Policy Scenario 1) in which all possibilities can be freely explored. While the new business models associated with specialised services can become crucial for the deployment of networks in Policy Scenarios 1-4, in Policy Scenario 5 ("open"), it is the demand for bandwidth associated to the basic internet service that will drive the demand for broadband deployment. In Policy Scenario 4, the fact that there are minimum requirements

for basic internet access service but specialised services can be simultaneously offered, leads to both effects having a moderate influence in driving the market.

SOCIAL

Social value

Technology embodies our cultural values (41) (42) and we should be looking at the socially constructed aspects of the network (43). "To say that something is socially constructed [...] is to say: This thing could not have existed had we not built it; and we need not have built it at all, at least not in its present form. Had we been a different kind of society, had we had different needs, values, or interests, we might well have built a different kind of thing, or built his one differently" (44).

The internet, as we have collectively constructed it, has an open and neutral architecture grounded on the end-to-end principle (23). This doesn't mean that there is no intelligence in the network. The internet has evolved in many ways; over the years, the network engineering community has debated and refined its end-to-end arguments to keep them relevant to the changing context of the internet's social and technical dynamics (45). In the context of the net neutrality debate, there seems to be a consensus that traffic management has been an essential part of the network: the *pipes are not dumb*. Different stakeholders[19] have expressed the need to manage network access to improve efficiency, avoid or diminish the effects of congestion, or combat security threats (1). However, the fact that traffic management exists and is important should not distract from the fact that one of the internet's most essential qualities is its "ability to connect", that it has an edge-dominant architecture and that this has played an essential role in its development as a platform for innovation, creativity and economic opportunity.

P.S. 1 "Market"	P.S. 2 "Code of Conduct"	P.S. 3 "Law"	P.S. 4 "Guarantee"	P.S. 5 "Open"
				This is the internet the society has constructed, with its needs, values and interests.

Human rights

The debate on net neutrality is often framed as an economic debate that focuses on the market, its players and its impact for competitiveness and growth. It can be argued, however, that the tools designed to guarantee market efficiency may not be designed to guarantee the full enjoyment of specific fundamental rights online.

"Electronic networks have a public function, being one of the principal means of exercising the right to freedom of expression and information, and playing an essential role in letting

[19] See comments from Google and Verizon (joint presentation), TIA, and Yahoo! to FCC GN Docket No. 09-191 and WC Docket No. 07-5

individuals participate directly in democratic life. To this extent, the Council of Europe has highlighted the public service value of the internet – which is grounded on the consideration that every individual has the right to fully benefit from the information society, receiving trustworthy and diverse information – and has recommended to the Member States to elaborate a clear legal framework delineating the boundaries of the roles and responsibilities of the key stakeholders in order to impede that the use of ICT could adversely affect any fundamental rights" (23).

Part of the problem lies with the unique role of the internet service providers in the value chain, which puts them in a position in which they could effectively exercise censorial powers. Furthermore, the internet's role providing access to information links it directly with media pluralism and cultural diversity online, which constitute a cornerstone of democracy. Protecting the European citizens' right to freedom of expression, information and communication, the right to education, the right to assembly and the right to free elections needs to play a role in the net neutrality debate.

P.S. 1 "Market"	P.S. 2 "Code of Conduct"	P.S. 3 "Law"	P.S. 4 "Guarantee"	P.S. 5 "Open"
			Protection of NN is fundamental to guarantee that the internet maintains its public-service value	
	No discrimination as an essential feature for the internet from a human rights' perspective			

TECHNOLOGICAL

Traffic management

According to OFCOM, "the growing use of the internet creates a challenge for network operators, who must consider how best to meet demand. They are likely to do so partially by investing in new capacity, and partially by rationing existing capacity" (25).

The 2012 study elaborated by BEREC showed that traffic management on behalf of European operators is currently taking place and results in restrictions of a variety of categories: differentiation (of traffic, or providers…); technical network protection (congestion, security); implementation of business models (data caps, specialised services); and legal obligations (3).

Some of these practices are considered necessary for the proper functioning of the internet; others are aimed at improving the overall experience of the internet users; others respond to how electronic communication providers categorize different usage of the network, be it for a better management of the resources or for the implementation of different business models.

The current legal implementations of net neutrality provision in Europe (The Netherlands, Slovenia), as well as the drafted text from the European Commission, all include exceptions

under which traffic management is authorized (e.g. implementing a court order, preserving the integrity and security of the network, minimizing the effects of exceptional congestion).

BEREC notes that 30% of the fixed and 20% of the mobile operators report certain traffic management practices which have been categorized under the umbrella of "measures [...] allowing a more efficient protection and management of networks", including congestion management, security and integrity, and controlling "spam" traffic. Congestion management aimed exclusively at protecting the network uses application-agnostic techniques, treating all traffic types equally (often referred to as "fair sharing" and similar methods" (3).

Additionally, all economic operators are subject to "measures upon legal order" ("e.g. anti-bill shock in roaming, court orders, blocking of child pornography sites, etc.").

These practices are likely to continue in all scenarios.

P.S. 1 "Market"	P.S. 2 "Code of Conduct"	P.S. 3 "Law"	P.S. 4 "Guarantee"	P.S. 5 "Open"
Traffic management: "network protection" and "measures upon legal order" will continue to happen in all scenarios.				

However, when dealing with congestion, ISPs can be more creative. Not all techniques are application-agnostic: others include functions performing throttling and/or blocking of specific applications, which could also be done using deep packet inspection technologies. OIA's Mobile working group did a case study on AT&T's restrictions on Apple's FaceTime; this application "appears to have been designed in a way that generates a substantial amount of traffic and consumes more bandwidth than comparable applications (e.g. Skype)" (18). Because of limited resources, there is an incentive for online service providers to optimize bandwidth usage. Decisions like AT&T's could push this behaviour and increase these incentives.

Although AT&T has agreed on its own accord to support FaceTime on all of its tiered data plans, the OIA's Mobile working group "agreed that carriers should also have the freedom to manage their limited cellular network resources" (18).

In a situation in which bandwidth is a limited resource, discouraging *excessive* **(weighed against comparable applications**) bandwidth consumption by online services and applications has some positive impact: it brings a better experience for internet users overall, it stimulates innovation and it leads to optimization of resources. However, it must be noted that access to online service and applications is a driver for broadband adoption and for investment in infrastructure (35).

P.S. 1 “Market”	P.S. 2 “Code of Conduct”	P.S. 3 “Law”	P.S. 4 “Guarantee”	P.S. 5 “Open”
Dealing with excessive bandwidth usage allows optimization of resources and, eventually, a better user experience				

The effect of this ability of ISPs to deal with congestion applying negative discrimination based on excessive bandwidth usage can actually lead, in Policy Scenario 1 (“market”), to the optimization of resources and, eventually, to a better user experience. While this effect needs to be accounted for, it is unlikely that it will reshape the scenario or significantly alter the position of market players.

Since this type of discrimination would not take place in the other scenarios, it would not act as a driving force there.

According to BEREC, some examples of European operators managing traffic include assigning lower priority during peak times to applications such as file downloading, P2P, etc. (3). Services typically subject to this kind of treatment would be services have high volume, are not delay-sensitive and it is technically unfeasible or uneconomic to charge for them.

However, this type of traffic can hold a high value for users and they play a role in promoting investment in infrastructure; precisely because of its high volume, users are encouraged to subscribe to broadband services and they can drive the demand and willingness to pay of users.

It is rather the users than other economic operators that fully receive the impact of these measures. Their ability to “vote with their feet” (26) will depend on transparency and competition: if users are fully informed of their ISP’s techniques and there is enough variety of offers, the demand can drive the market towards offers without this type of negative discrimination as a means to deal with congestion. However, the Council of Europe notes (23) that the highly competitive EU telecommunications market has been unable to avoid restrictions, as evidenced by the BEREC 2012 study.[20]

On the other hand, communication should not only be transparent, but also effective. BEUC (13) and Ofcom highlight that “if ISPs offer a service to consumers which they describe as *internet access*, [...] this creates an expectation that this service will be unrestricted, enabling the consumer to access any service lawfully available on the internet” (25).

[20] “The 2012 study elaborated by the BEREC and the European Commission clearly demonstrated that, although the EU telecommunications market is highly competitive, a considerable amount of restrictions is currently put in place by European operators. Particularly, over 20% of EU end-users are affected by restrictions consisting in the blocking and/or throttling of peer-to-peer (P2P) traffic, on both fixed and mobile networks, and the blocking of Voice over IP (VoIP) traffic, mostly on mobile networks” (23)

P.S. 1 “Market”	P.S. 2 “Code of Conduct”	P.S. 3 “Law”	P.S. 4 “Guarantee”	P.S. 5 “Open”
Discrimination against high-volume, not delay-sensitive services and applications				

The incentive for ISPs to deal with congestion by applying negative discrimination against high-volume, not delay-sensitive services and applications in Policy Scenario 1 (“market”) means restricted access for users to certain online services and applications. Experience shows that, given the possibility, ISPs will engage in this behaviour.

Since this type of discrimination would not take place in the other scenarios, it would not act as a driving force there.

BEREC 2012 study specifically required to electronic communication providers to reference any restriction (contractual and/or technical) to the transportation of VoIP traffic (3). Some level of restriction was reported by 28 operators (out of 115) on mobile networks, affecting at least 20% of subscribers.[21]

VoIP provides a service that competes directly with voice services offered by the electronic communication providers, which harms their business model. Therefore, there is an incentive for ISPs to restrict internet traffic coming from certain services or applications so as to protect their revenue. This harms competition and harms users who wish to access online services.

As long as the restrictions apply to widely known online services, there will still be pressure from the users for the electronic communication providers to include offers that do not discriminate against these services. With enough transparency and competition, it can be argued that some, but not all ISPs will put in practice anti-competitive restrictions. This seems to be in agreement with BEREC findings at the European level.

Even ISPs with significant market power have to attract many complementary users. This limits incentives and power to discriminate (at least in the gross sense of blocking). Content is needed to attract subscribers and vice versa. So ISPs with significant power in one part of the market may be constrained by (potential) competition in other parts and thus unwilling or unable to engage in “bad” discrimination.

As to what happens with services that are not widely known and therefore not actively demanded by the users, ISPs could foresee the potential competition and opt to block these services or service classes without much risk of losing unhappy customers. This has a negative impact in the over-the-top market and on innovation, acting as an entry barrier.

However, it must be noted that the decision to take legislative measures in The Netherlands took place after the market had arrived at a point in which all mobile communication providers

[21] “Some apply it to all their users, others to some of their users only; some apply permanent restrictions, others apply limited period restrictions, etc.” (3)

were blocking VoIP, which points to transparency and competition not being enough of a deterrent to warrant absence of negative discrimination on the basis of avoiding competing services.

Even if there is a wide variety of electronic communication services offers and some or most of them do not include restrictions, it can be argued that certain services, such as precisely VoIP, are indeed "basic services" and it is the right of the citizens to have access to them through all (not only some) of the internet access service offers in the market.

P.S. 1 "Market"	P.S. 2 "Code of Conduct"	P.S. 3 "Law"	P.S. 4 "Guarantee"	P.S. 5 "Open"
Negative discrimination affects availability of services, competition and innovation				

The incentive for market players to raise entry barriers to potential competitors through alliances and vertical integration in Policy Scenario 1 ("market") leads to a decrease in the availability of services, competition and innovation. Not only are ISPs and CAPs likely to engage in this behaviour, but it is also likely to have a significant impact in the market, acting as a driving force.

Since this type of discrimination would not take place in the other scenarios, it would not act as a driving force there.

Quality of experience

The Internet Protocol suite is the networking model and a set of communication protocols used for the internet and similar networks. It is commonly known as TCP/IP. The TCP/IP model and related protocols are maintained by the Internet Engineering Task Force (IETF).

TCP is an end-to-end protocol.[22] The system design or architecture of the internet exports a significant amount of control to network endpoints. In many instances, we find the assertion that end-to-end notions explain the internet's essential nature (45). However, while TCP runs exclusively on endpoints, the Internet Protocol, IP, runs on the routers that make up the internet's core as well as on network endpoints (46). Furthermore, the internet is not actually a complete network: it is "a network of networks or virtual network that occupies a limited, intermediate position in a layered protocol model or protocol stack. [..]. IP datagrams are not self-transporting: they're encapsulated within datalink protocols such as Ethernet, SONET, or Wi-Fi, and transported according to physical network policies and capabilities."

In 2004, James Kempf and Rob Austein wrote RFC 3724 on challenges facing the end-to-end arguments. The principal pressures were actually new requirements that came to the internet as the result of the broader user base, new multimedia applications, and the requirements of commerce and government (45). Yoo maintains that TCP/IP is "poorly suited to applications that are less tolerant of variations in throughput rates, such as streaming media and VOIP, and

[22] RFC 675 "Specification of Internet Transmission Control Program"

is biased against network-based security features that protect e-commerce and ward off viruses and spam" (47).

Although the discussion tends to focus on quality of service (QoS), there are other relevant parameters for the internet experience: bitrate or throughput (the amount of data transmitted in a unit of time), delay, jitter (time variation of the average delay), packet loss ratio. There are constraints in the service provision of real time applications that affect the internet experience (48). In order to understand when an internet service is "good enough", it might be necessary to examine the quality of the user experience rather than the technical parameters (18).

The long list of promised revolutionary applications (e-education, e-medicine, e-government, e-commerce, e-entertainment) face many challenges and demand more and more bandwidth. However, when faced with the question of whether technology and broadband will solve these issues, more experts interviewed are sceptical: with availability of more resources, more demanding services and applications tend to appear.

Specialised services arise as a means to manage resources and deal with these flaws. Ofcom states that they "do not have a general objection to models of competition where vertically integrated operators do not provide open access to their networks, provided that there is genuine competition and rivalry among the firms" (25). The idea that specialised services encourage development of innovative services and applications and increase their availability and quality for end users is quite widespread in Europe.

All of these references to specialised services are based on the assumption that these are offered as a separate layer of the open, non-discriminatory internet, recognizing the benefits associated with both types of service (basic and specialised), and seeking for them to co-exist (25). How to "separate" this layer, however, remains a challenge. As long as both services have to be delivered down the same connection, "separating" services is mostly about having a clear definition of the allocated resources and being transparent about what customers will have access to depending on which service they are hiring.

Intuitively, specialised services would be services offered by broadband providers that share capacity with broadband internet access service over providers' last-mile facilities, such as: facilities-based VoIP, IP video, e-reading services, heart rate monitoring, energy sensing, etc. (49).

P.S. 1 "Market"	P.S. 2 "Code of Conduct"	P.S. 3 "Law"	P.S. 4 "Guarantee"	P.S. 5 "Open"
Revolutionary and innovative applications delivered with Quality of Experience				

It can be argued that the policy scenario 5 ("open") has proven to be able to support "revolutionary and innovative applications" throughout the years, and will especially be able to do so as technology and bandwidth continue to improve. However, this figure seeks to outline the trend that would follow as internet service providers use technology to improve whichever parameters would most adequately benefit specific services.

Specialised services

The development of specialised services would allow certain services and applications to be offered through the same communications infrastructure but under a different set of rules. They are developed to deal with the challenges of different data types and different requirements of content and applications. These services should not be confused with the internet broadband access, even if they use the same technology and pipes.

The idea behind specialised services is that content, applications and service providers who are not consumers would be able to negotiate flexible service quality of service levels with providers of electronic communications to the public; this is expected to play an important role in the development of new services, it would allow providers of electronic communications to better balance traffic and prevent network congestion.

BEREC considers that specialised services are usually provided in order to ensure adequate service characteristics and they make the case that specialised services can be provided in a way that is not at the expense of internet access service offers (3). The European Commission explicitly defines a *specialised service* as "an electronic communications service or an information society service that provides the capability to access specific content, applications or services, or a combination thereof, or provides the capability to send or receive data to or from a determined number of parties or endpoints; and that is not marketed or widely used as a substitute for internet access service"[23].

In the US, the OIAC[24] was assigned the task of defining the term, setting a limit on which IP-based services are subject to the FCC "Open Internet rules". The working group concluded that the primary criteria proposed by the FCC to classify a service as "specialised" are that (1) it is not used to reach large parts of the internet, and that (2) it is not a generic platform—but rather a specific "application level" service. The committee identified one additional criterion that might classify a service as specialised: capacity isolation from broadband internet access service (18).

The reason why defining "specialised services" is so important to the Open Internet Advisory Committee is the risk that, since both types of services would be sharing the "pipes", broadband providers may constrict or fail to continue expanding network capacity allocated to broadband internet access service to provide more capacity for specialised services.

[23] See first draft of the Regulation made available at: http://edri.org/files/consolidateddraft-ISC070713.pdf

[24] The mission of the FCC's Open Internet Advisory Committee (OIAC) is to track and evaluate the effects of the FCC's Open Internet rules

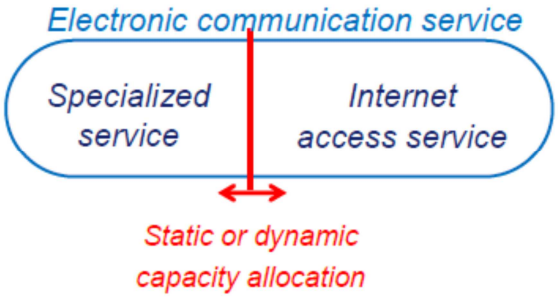


Figure 5: Sharing of access resources. Source: (3)

A recent example in the European market of this tendency was provided recently by Deutsche Telekom. According to announcements[25] made by the German operator, there will be strict data caps on home users' internet downloads by 2016, but its own TV service, called T-Entertain (IPTV), would be exempted (16).

As specialised services compete with the internet for capacity, it could get to the point that material classes of internet applications are not viable: that's what is commonly referred to as "dirt road" future. It appears necessary to work hard, from a regulatory point of view, on the definition, the oversight mechanisms and other measures to keep track of how providers manage capacity and service levels provided to the consumer.

They can lead to network fragmentation, providing end-users with access to filtered networks consisting in "walled gardens" that coexist with the open and neutral internet (18). On the other hand, a formal analysis of the impact of a transition from the net neutrality regime to a discriminatory regime shows that when ISPs offer differentiated traffic lanes there are incentives to increase investment in broadband capacity (50).

In policy scenario 5 ("open"), when all capacity is assigned to broadband internet access, the process to develop quality of service would mostly have to rely on the improvement of bandwidth and other parameters. The good effect is the "innovation without permission" effect that has characterised the internet ecosystem all these years, but might miss out on the opportunity to optimize today's available for resources for an improved quality of experience on specific applications and services.

[25] Announcement on Deutsche Telekom's website: http://www.telekom.com/medien/produkte-fuer-privatkunden/184370

P.S. 1 "Market"	P.S. 2 "Code of Conduct"	P.S. 3 "Law"	P.S. 4 "Guarantee"	P.S. 5 "Open"
Service levels in broadband internet access respond to business models and demand. Risk: walled gardens; "permission-to-innovate" Opportunity: increase investment in broadband capacity			Minimum service levels guaranteed for broadband internet access. Innovation happens "in both lanes"	All capacity is assigned to broadband internet access. "Innovation without permission"; less capacity to optimize current resources for specific services

LEGAL

For each of the considered scenarios, there is a legal framework that contributes to its development in one direction or another. Protection of consumers' rights and the general anti-trust framework, law enforcement, the role of NRAs and privacy implications all are part of the legal context.

The general purpose of different net neutrality policy scenarios have been captured for the purpose of scenario analysis; however, the implications of actually developing the policy framework, including details such as the chosen wording and the assigned roles, can lead to unexpected evolution of market and players.

Traffic management techniques currently used by operators may constitute an invasion of privacy (for example, deep packet inspection).

P.S. 1 "Market"	P.S. 2 "Code of Conduct"	P.S. 3 "Law"	P.S. 4 "Guarantee"	P.S. 5 "Open"
DPI – privacy				
			Definition of Minimum Service	
		NN law enforcement		
Antitrust law enforcement				

INNOVATION

Digital innovation has never been more readily available than today. With the unit of processing power halving in price every 18 months and the price of bandwidth and storage dropping even faster the cost of doing business online just keeps falling. Globalization has opened new markets and niche markets have been redefined by the *long tail*[26].

The internet, being a global communication network with an edge-dominant architecture, has empowered users and their role in creating, distributing and contributing to knowledge and innovation. “Markets work at their best by enabling a process of experimentation and discovery, under which many ideas are tried, with the successful ones taken forward and the unsuccessful discarded. It is notable that the internet economy has been characterized by the creation of an environment in which a vast number of different individuals and companies have been able to create ideas and test them through a global network that offers a massive potential addressable market” (25).

This idea that, in the internet, anyone who wants to can develop an application or create a website has been referred to as “innovation without permission”. The internet has low access barriers for end-users, content and application providers and internet service providers. Openness and interoperability in the ecosystem guarantee that more ideas can be added, systems can be complemented and products and services can be enhanced by other market players.

Translating openness and interoperability into the internet ecosystem has effects all along the value chain: avoiding the lock-in effect in both internet service providers and online service providers, avoiding anti-competitive behaviours by players who hold a gate-keeping capability and facilitating the possibility for users to switch providers. At the connectivity level, this translates into keeping electronic communication providers from imposing restrictions to users that might limit their ability to access certain services, content and applications; at other levels in the value chain, it would mean providing alternatives to the current application store models or ensuring standards compliance by proprietary applications.

The European Commission’s Regulation takes into account the need “to favour efficient investment and innovation in new and enhanced infrastructures which reach throughout the Union.” Looking at it from a geopolitical standpoint, it looks like European start-ups are having a hard time getting ahead of the game. Whatever entry barriers there may be in place, European innovators seem to be at a disadvantage. However, experts who have experience as innovators and work in projects that encourage advocate and support innovation cite a number of reasons why, even in this time of low prices for processing capacity and storage, even in this globally connected world with access to distant markets, European start-ups are struggling. Access to funding, cultural barriers, a European fragmented market and regulation, shortage of nurturing environments, struggles with creating differentiation and competition

[26] The term long tail, coined by Chris Anderson in a Wired article, describes the retailing strategy of selling a large number of unique items with relatively small quantities sold of each. Anderson elaborated the concept in his book *The Long Tail: Why the Future Business is Selling Less of More*.

with cheap labour markets have been cited as some of the barriers that European innovators face.

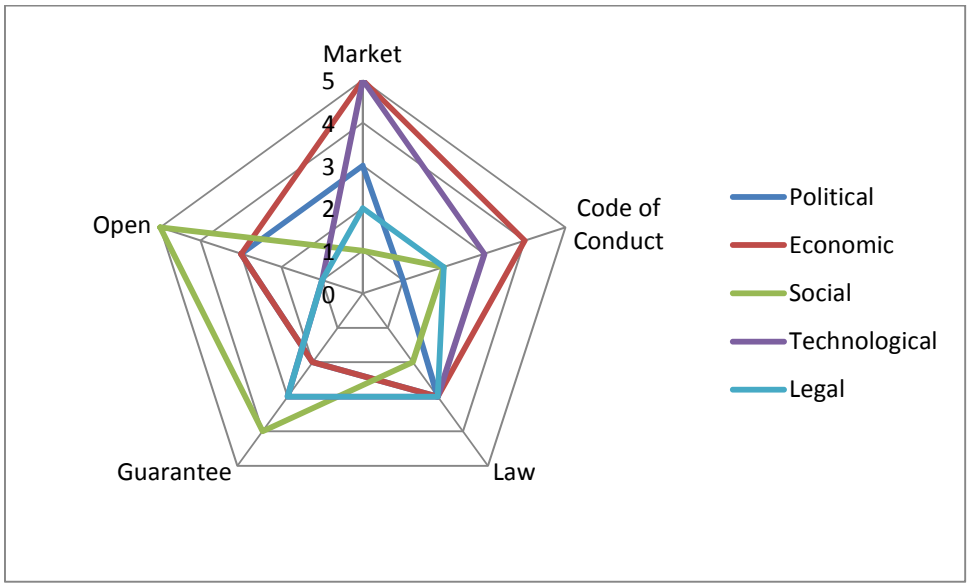
Innovation as an argument has been put forward by opposing perspectives on net neutrality: online service providers being discriminated against by internet service providers might speak of the level playing field of a non-discriminative internet connection; internet service providers might argue that there is a great deal of innovation waiting to happen related to services and applications that require certain kind of networks and quality guarantees; players all over may point fingers at different places where content discrimination may be on-going.

While entrepreneurs and start-ups benefit greatly from a level playing field, easy and cheap access to connectivity and interoperability in all layers, the bigger and established players will tend to develop differentiation strategies and lock-in effects so as to minimize the churn rate. This is the effect by which innovators want low entry barriers when they are starting but high barriers when they are big enough to care about keeping their users and avoiding new competitors.

One of the advantages of competitive markets is that companies have to do right by the customer in order to keep in business. This generally means either lowering prices or increasing quality. In the context of the net neutrality debate, this means that online service providers will try to improve the quality of the user's experience and internet service providers will try to differentiate themselves in order to avoid commoditization.

CONCLUSION: EVOLUTION OF POLICY SCENARIOS

The PESTLE analysis has shed light on what driving forces may lead the evolution of the identified policy scenarios. According to the outlined factors and how heavily they weigh in each of the scenarios, their likely evolution can be inferred. As to which dimension is more relevant in order to determine each of the five developments, they vary. The following graph illustrates how each area is relevant depending on the scenario.



POLICY SCENARIO 1: "MARKET"

	No discrimination (voluntary)	No discrimination (law)	Specialised services	Minimum QoS
Policy Scenario 1: "Market"				

In this policy scenario players evolve under conditions of transparency and market competition. There is no code of conduct or voluntary adherence to a non-discrimination principle; specialised services can be developed and capacity allocation can be freely managed by telecommunication operators.

There are incentives to explore the provision of specialised services, bundling and vertical integration, data caps and other strategies as business models. Although there are policy and legal constraints, an advantageous solution to all stakeholders requires that the users, "voting with their feet", be the ones setting the limits for the private companies. This puts a lot of

weight in transparency, in making sure that the service offers are clear, understandable and accurate, and equally requires that users are able to switch providers with ease.

Some of the business models that may arise will probably be linked to creating a lock-in effect and raising entry barriers for competitors. There are no legal guarantees that the basic internet access will continue to co-exist (together with specialised services) or maintain a minimum quality, although there are economic incentives for ISPs to continue to offer this service, as it will likely be cheaper and because of a long tradition of broadband as killer application of the internet. It would be equivalent to a two-tiered (or multi-tiered) internet, with a fast (or higher quality) lane and a slower one.

The technological aspects weigh heavily in the evolution of this scenario, as well. In this scenario, ISPs are free to deal (and will likely do so) with excessive bandwidth usage on behalf of particular applications, to manage high-volume, not delay-sensitive services and to develop and deliver new services and applications with higher quality of service (QoS) and/or quality of experience (QoE).

The ISPs and big, established CAPs would reinforce their position in the market. ISPs could also foster growth of medium-sized over-the-top player, becoming an ally to them through special offers and vertical agreements. However, this type of alliance could become a requisite and an effective entry barrier for start-ups ("permission to innovate").

The basic internet access that will likely co-exist with newer, higher-quality service will probably include data caps and could even exclude some widespread services (some even considered basic by some stakeholders, such as VoIP).

Current legal framework applies but all control is necessarily ex-post.

POLICY SCENARIO 2: "CODE OF CONDUCT"

	No discrimination (voluntary)	No discrimination (law)	Specialised services	Minimum QoS
Policy Scenario 2: "Code of Conduct"				

Policy scenario 2 ("code of conduct") considers the case of market players voluntarily signing a code of conduct or industry agreement not to perform traffic discrimination. No specific legal framework requires this of the telecommunication operators and specialised services can be developed and capacity allocation can be freely managed by telecommunication operators.

As in "market", business and technological factors act as main driving forces; the mitigation effect of a having an industry voluntary agreement need to be put into perspective: the fact

that it is not enforceable and companies' adherence is optional could create some uncertainty as to how trustworthy the non-discrimination practices really are.

As in the previous case, there are business incentives to explore business models and, in doing so, to look for lock-in effect and raising entry barriers for competitors. The main deterrent for the industry continues to be customer choice (thus the importance of transparency and competition) and it is likely to develop into a two-tiered internet, just like in the previous case.

However, the non-discrimination agreement leads to a smaller set of technological measures that can be applied; this leaves more room for a wider range of CAPs and more innovation.

Like in the "market" scenario, the basic internet access that will likely co-exist with newer, higher-quality service will probably include data caps, but in this scenario it would not exclude any (basic or not) services, since that would entail traffic discrimination.

POLICY SCENARIO 3: "LAW"

	No discrimination (voluntary)	No discrimination (law)	Specialised services	Minimum QoS
Policy Scenario 3: "Law"				

Policy scenario 3 ("law") is different from the previous scenario ("code of conduct") in that non-discrimination is a legal requirement imposed to the ISPs. The positive effect for innovation is now reinforced because of the certainty associated with the legal requirement and the predictability that the rules of the game are not changing unexpectedly.

Political, economic, technological and legal factors all contribute in a balanced manner as drivers for scenario development. The need for political harmonization and the moderate approach of this scenario make it a politically attractive approach.

Economic incentives still call for new business models, although there are limits to what techniques can be employed (and they are enforceable), so that availability of a wide range of CAPs and a more favourable context for innovation are present.

Like in the "market" scenario, the basic internet access that will likely co-exist with newer, higher-quality service will probably include data caps; no service can be excluded due to traffic discrimination, although the more bandwidth-hungry over-the-top applications may find it hard to compete with vertically integrated services.

POLICY SCENARIO 4: "GUARANTEE"

	No discrimination (voluntary)	No discrimination (law)	Specialised services	Minimum QoS
Policy Scenario 4: "Guarantee"				

Policy scenario 4 ("guarantee") adds to the previous scenario the requirement that a minimum capacity always be allocated for the open internet access service, in case the business models around specialised services incite a progressive disappearance of basic internet access service.

The social dimension plays a bigger role in this case: it is the idea that the basic, open, mostly best-effort, non-discriminative internet should continue to exist and to maintain a minimum level of service that leads to establishing said QoS by law. The direct effect is that the two-tiered Internet cannot develop into a "dirt road", a risk that in previous scenarios is only mitigated by economic incentives (through customer choice).

This guaranteed levels of service in the open, basic internet access has a positive effect on innovation: the true spirit that there is "no permission to innovate" in the internet: no need to become an ally of ISPs in order to offer vertically integrated services and no fear that the ISPs (and their competing services) will find economic incentives and technological means to maintain users away from innovative services and applications offered through the open internet.

POLICY SCENARIO 5: "OPEN"

	No discrimination (voluntary)	No discrimination (law)	Specialised services	Minimum QoS
Policy Scenario 5: "Open"				

Policy scenario 5 ("open") bans traffic discrimination and specialised services, forcing all services to be open, mostly best-effort and non-discriminative.

There is a strong case on the social dimension for this policy scenario and activists have been demanding this approach from their political representatives. The drivers for infrastructure deployment come necessarily from bandwidth demand and there is a strong need to provide QoE with the technological means of best-effort traffic. It can be hard to trigger the virtuous cycle of bandwidth demand: users will pay for more bandwidth only after the services and

applications they desire to access need it; at the same time, over-the-top services and applications need to reach a wide audience and will try to be moderate in their bandwidth consumption, thus slowing down the process of infrastructure deployment. At the same time, a different virtuous cycle has been taking place in the open internet, one by which new services and applications require new technology, and then that new technology is pushed to the limit by yet more apps, launching an advancement in technology.

Innovation continues to enjoy the “no permission to innovate” framework. There is no room for a two-tiered internet.

GLOSSARY

CAP	Content and Application Provider
NN	Net Neutrality
EU	European Union
TCP/IP	Transmission Control Protocol / Internet Protocol
IETF	Internet Engineering Task Force
FCC	Federal Communications Commission
ISP	Internet Service Provider
QoE	Quality of Experience
QoS	Quality of Service
VoIP	Voice over IP
OTT	Over-the-top
NRA	National Regulatory Authority

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